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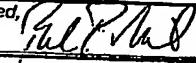
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TITLE OF THE INVENTION (500 characters max.) AUTOMATIC CONFIGURATION OF IEEE 802.1X CLIENTS FOR USE IN PUBLIC HOT SPOTS		
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Respectfully submitted, Signature  Date: 3/14/03		
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## AUTOMATIC CONFIGURATION OF IEEE 802.1X CLIENTS FOR USE IN PUBLIC HOT SPOTS

IEEE 802.1x has been adopted as an important tool for providing WLAN security. Several implementations, including that on Windows XP, have started being deployed. However, IEEE 802.1x was originally designed for enterprise usage scenario where a more or less static configuration is possible. It lacks the flexibility for a more dynamic environment, such as public wireless LAN hot spots. For example, IEEE 802.1x clients normally require complex configuration (e.g. authentication method, authentication server domain name, user name, password etc.) that can be confusing for ordinary users. When a user tries to access a new public hot spot, all the parameters may need to be reconfigured. Further, the IEEE 802.1x client alone is not capable of creating an account for a user, which is a vital feature for any public WLAN hot spots. In this disclosure, we propose a mechanism in which a WLAN system can automatically configure the IEEE 802.1x client on the wireless user device through the client web browser and ActiveX control/Plugin. With this mechanism, a WLAN hot spot may present the user with a list of possible authentication servers and let the user select the server that the user wants to use. In case the user has an account with the server and the IEEE 802.1x parameters are configured for that account, the IEEE 802.1x client will be automatically set up for authentication. In the case the user does not have an account configured for that server, a new account can be created on the spot and the IEEE 802.1x client is subsequently configured for authentication.

In [1], we described a technique that slightly modifies the behavior on the WLAN access point without changing the IEEE 802.1x protocol itself. With the modification, before the user gets fully authenticated, the user traffic is not completely blocked. Instead, the WLAN filters user traffic and the user is allowed controlled access to the network. The technique described in this disclosure relies on such support in the access point. It concerns with how we can use such a feature to facilitate user interactions that configure IEEE 802.1x client software for proper authentication.

### Features of our solution:

- It uses IEEE 802.1x, the adopted standard for secure IEEE 802.11 wireless access, for authentication.
- It uses web browser together with ActiveX control or plug-in for natural user interactions. Such interactions may include, among other things, the creation of user accounts, the selection of which accounts to use, and the acceptance of access terms.
- As the result of the user interactions, IEEE 802.1x client parameters are automatically configured according to user choices, the secure authentication can then take place based on the IEEE 802.1x protocol.

The advantage of such an approach is that it offers both standard based strong security while in the mean time allows intuitive, browser based familiar user experience. Security and user friendliness are both important requirements in a public wireless access

environment. The former ensures users peace of mind and prevents hackers from taking advantage of the network and the user traffic. The latter is key to attracting non-technology savvy users.

We now describe how this scheme is enabled and what needs to be done in the WLAN and on the user machine.

On the WLAN side, the access point (AP) must support IEEE 802.1x. Further, the behavior of the IEEE 802.1x state machine on the AP needs slight modification according to [1]. In summary, instead of completely blocking user traffic before the user is authenticated through IEEE 802.1x protocol, the AP partially opens access for the user traffic. Such traffic is then filtered at higher protocol layer, e.g. at the IP layer. One possible filtering is to redirect all user HTTP requests to a controlled web server, which presents the user the necessary information such as access rate information, user accounts creation and authentication method selection. This enables the necessary user interactions we mentioned earlier.

On the user side, an IEEE 802.1x client is necessary. Given the standard adoption and the support from Microsoft (built-in on windows XP machines), this requirement is almost a given in the near future. The user uses a web browser for interaction. One more piece is an ActiveX control or a plug-in for the browser. Such an ActiveX control/plug-in is used for automatically configuring the IEEE 802.1x client as the result of the user interaction. Similar to the web browser based authentication mechanism described in [2], the ActiveX control can be dynamically downloaded after user interactions, or installed on the user machine a priori.

Figure 1 illustrates a typical interaction sequence:

- When a user tries to access a public WLAN at a hot spot, the IEEE 802.1x client on his machine would automatically start the authentication process according to the current configuration on the machine.
- In all likelihood, the user machine is not configured for access at that hot spot (it could be configured for office use, or the user doesn't even have an account that allows him to access this hot spot)
- The user opens his browser and tries to access the network. With the modified behavior of the WLAN AP, the user requests are redirected to a local web server.
- The user is presented with a greeting page. The page may contain a list of service providers that the user wants to use for authentication and charging. Selecting one of the providers would activate the ActiveX control/plug-in on the user machine. It takes the necessary parameters that specify the right configuration in order for the user to be successfully authenticated by the service provider.

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- Using these parameters, the ActiveX control/plug-in configures the IEEE 802.1x client properly and restarts the authentication. The user is successfully authenticated and the WLAN AP can fully open access for the user.

In case the user does not have any accounts to use for authentication, the greeting page also allows the user to create an account on the spot. Upon creation of the account, the ActiveX control/plug-in will be activated in a similar way.

**References:**

- [1] PU020242, Charles Wang, Sachin Mody, Junbiao Zhang, Kumar Ramaswamy, "SEAMLESS PUBLIC WIRELESS LOCAL AREA NETWORK USER AUTHENTICATION" filed as U.S. Provisional Appln. Serial No. 60/376029, on May 13, 2002.
- [2] IU020369, Junbiao Zhang, Saurabh Mathur, Kumar Ramaswamy, "A WEB BROWSER BASED HOT SPOT WLAN ACCESS SOLUTION WITH STRONG SECURITY"

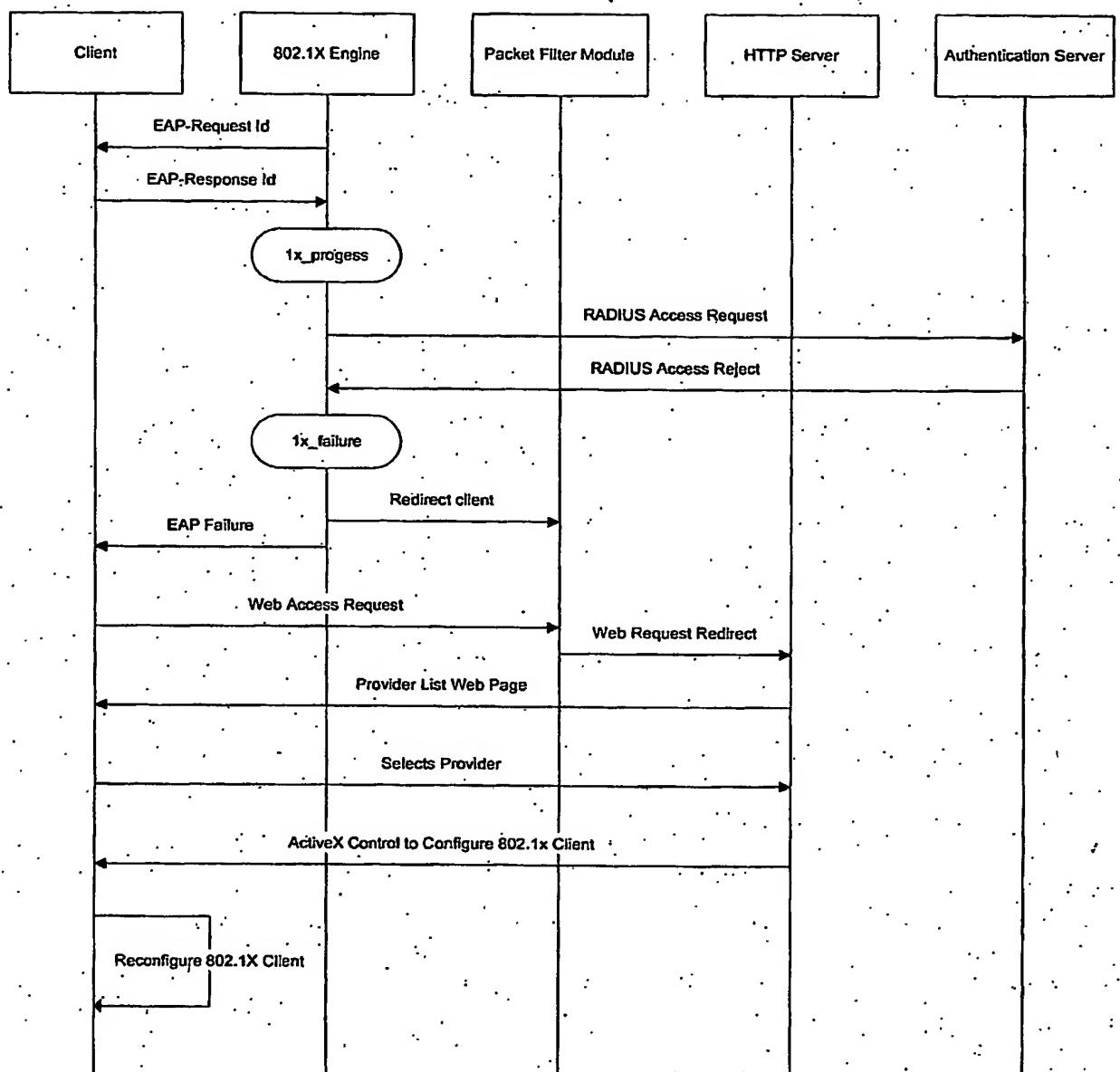


Figure 1. 802.1X Client Configuration

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